

Abandoned Mine Report Prudential

California Department of Conservation, Office of Mine Reclamation

Report Date: 30-Mar-2009 04:35 pm

MINEHUB

mine_name:	Prudential = Perrins, State Ledge, Selena
omr_id:	292120
mine_id:	2757
county_name:	NEVADA
commodity:	Gold
file_date:	3/30/2009 3:06:48 PM
last_date:	2/27/2009
crew_initials:	DPT, SFH
gps_person:	DPT
note_taker:	DPT
data_enterer:	dtibor
data_source:	OMR
distict_name:	Grass Valley
aml_status:	ABANDONED
	On private property. Visited with landowner permission.
cnty_status:	ABANDONED
gis_id:	R022714A2008DPT1
gis_type:	point
gis_accuracy:	1
quad_code:	39121B1
quad_name:	Grass Valley
PLSS:	15N, 8E, Sec. 10, SE 1/4 of SE 1/4, MDBM
elevation:	2000
ddlat:	39.16082684
ddlon:	-121.066974921
teale_x:	-92119.85283
teale_y:	127547.35546

SITE DESCRIPTION:

Site consists of two adits and a large waste pile. Features are located on the south side of Wolf Creek, near the beginning of the Tarr Ditch. The literature discusses several thousand feet of underground workings accessed via an adit, as well as an upraise to the surface (not located). Old roadbeds, minor surface disturbance, and the like on property also (not inventoried as features). A ten-stamp mill was located "1/2 mile" from the adit; unclear where this location is. The features are on private property, currently undeveloped but planned for construction (one

single-family home?). Site is fairly well overgrown with vegetation. Soil testing in 2006 found arsenic levels elevated above background levels, including some exceeding the hazardous waste benchmark.

ACCESS DESCRIPTION:

From Highway 49 and Allison Ranch Road junction, drive 0.4 miles north on Allison Ranch Road to Dawkins Lane. Turn left (west) on Dawkins Lane and a short distance to 10409 Dawkins Lane. This site is on private property.

OPERATIONS

op_type	op_date_beg	op_date_end
Underground	1/1/1867	Null

CONSTITUENTS OF CONCERN

coc	media	method	result	units
Arsenic	Null	Null	Null	Null

HUMAN ACTIVITY

activity_type	activity_dist
Dwelling	300
Road	0
School	1500
Town	0
Trail	0

LITERATURE

1895. Pictorial History of Nevada County. Page 155.

1892. Report of the State Mineralogist XI. Page 277-278,

1915. Report of the State Mineralogist XIII. Page 263-264.

Bean, Edward F. 1867. History of Nevada County. Page 203.

Bean. 1867. Sketch of the Mines. Grass Valley Township Directory. Page 218.

Directory of Grass Valley. 1865. page 110.

Report of the State Mineralogist XXXV11. 1941. pages 427-428.

California State Mining Bureau. 1919. Mines and Mineral Resources of Nevada County. Sacramento, CA. Page 238.

PAR Summary

recordDate:	3/30/2009		
AprScore	ExpScore	Sum	
Phys:	800	48	848
Chem:	500	53	553
parNulls:	False	Total:	1401
explosives:	False	hazmat:	False
idlh:	False	hcSig:	False
aqualnvr:	False	wildlife:	False

offsite:	False
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MINE PHOTOS

photo_path	is_site
View down steep face of waste pile, towards creek.	False
View across top edge of waste pile.	False
Flatter area of waste pile.	False
View inside adit.	False
Adit portal.	False
Adit portal, with rock outcrop and oak.	False
View inside adit.	False

MINE FEATURES

Feature Id: 19451

file_date:	3/30/2009 4:21:33 PM
type:	Mine Waste
condition:	Stable
att_accur:	High
x-dim:	120
y-dim:	150
z-dim:	20
color:	Null
odor:	Null
gis_id:	A106176A2009AML1
gis_type:	point
gis_accuracy:	1
quad_code:	39121B1
quad_name:	Grass Valley
PLSS:	15N, 8E, Sec. 10, SE 1/4 of SE 1/4, MDBM
elevation:	2000
ddlat:	39.16082684
ddlon:	-121.066974921
teale_x:	-92119.85283
teale_y:	127547.35546

FEATURE DESCRIPTION

Mine waste pile. Large, flat-topped area devoid of much vegetation, with a steep long face running down nearly to Wolf Creek. Dimensions are an estimate; depth difficult to determine. Not clear where waste material originated; there does not appear to be a collapsed adit in the hillslope adjacent, but a shaft or adit could have been filled at some point in the past.

MINE PHOTOS

photo_path	is_site
View down steep face of waste pile, towards creek.	False
View across top edge of waste pile.	False

Flatter area of waste pile.

False

Feature Id: 19452

file_date:	3/30/2009 4:24:54 PM
type:	Horizontal Opening
condition:	Open, Partially Collapsed, Unstable
att_accur:	High
x-dim:	3
y-dim:	1
z-dim:	25 +
color:	Null
odor:	Null
gis_id:	R022714B2008DPT1
gis_type:	point
gis_accuracy:	1
quad_code:	39121B1
quad_name:	Grass Valley
PLSS:	15N, 8E, Sec. 10, SE 1/4 of SE 1/4, MDBM
elevation:	2000
ddlat:	39.160693719
ddlon:	-121.065999514
teale_x:	-92035.80855
teale_y:	127531.61454

FEATURE DESCRIPTION

Adit. The portal is cut under a rock outcrop and large oak; the portal has much material sloughed and collapsed into the run-in, making the aperture only 3' x 1' tall now. However, it opens up to 4' x 6' tall inside, bending out of sight to right at 25'. It appears that the far wall of the adit is covered in concrete, and the adit appears stable, cut in bedrock. Floor is flooded with 6" or more of water. The end of the run-in is only 50' from Wolf Creek; no real waste material present. Bat rank = B.

MINE PHOTOS

photo_path	is_site
View inside adit.	False
Adit portal.	False
Adit portal, with rock outcrop and oak.	False

Feature Id: 19453

file_date:	3/30/2009 4:30:06 PM
type:	Horizontal Opening
condition:	Open, Stable
att_accur:	High
x-dim:	3
y-dim:	1
z-dim:	75
color:	Null
odor:	Null

gis_id:	R022714C2008DPT1
gis_type:	point
gis_accuracy:	1
quad_code:	39121B1
quad_name:	Grass Valley
PLSS:	15N, 8E, Sec. 10, SE 1/4 of SE 1/4, MDBM
elevation:	2000
ddlat:	39.160535399
ddlon:	-121.065844856
teale_x:	-92022.65417
teale_y:	127513.8705

FEATURE DESCRIPTION

Adit. Up and to left of the other adit. Portal has collapsed much, but opens up to perhaps 4' x 4' tall inside. Runs straight back in bedrock, and appears to end at 75' or so (can't be positive that it does not go left or right there). No real waste material adjacent. Bat rank = B.

MINE PHOTOS

photo_path	is_site
View inside adit.	False

Slate Ledge Mine (= Selena Mine, Perrin's Mine, Prudential Mine)

Synopsis of Historical Literature

March 2, 2009

1865 – Perrin's Mill

Situated near Wolf Creek Station, about five miles south of Grass Valley. A saw and quartz mill combined, propelled by water power. Was built in 1864, with five stamps; first operated in 1865, and was engaged on quartz from the Slate Ledge.

1867 – Perris Ledge

Being "profitably worked" as of 1867. Water wheel used for pumping and hoisting purposes.

ca. 1892 – Slate Ledge

Situated on Wolf Creek, 5 miles from Grass Valley. Mine is opened by a tunnel on the vein about 2,000' in length, with its mouth on Wolf Creek; timbered for the first 1,000' of length. Dimensions of the tunnel are 5' by 3½' in the clear. Ore is hauled from the tunnel to the mill, ¼ mile distant; 10-stamp mill, with three Hendy pans, run by water with a hurdy wheel. It is the intention to reopen the old incline (winze), put in hoisting and pumping plan, and work the mine below the tunnel level. By means of overshot water wheels in Wolf Creek, the pump rods and hoisting rope will be carried up the bank 200 feet and down the incline, power thus being free, and pumping very light due to depth of "drain" tunnel (original adit, presumably).

1895 – Slate Ledge

Mine is worked through a tunnel. A new shaft (?) has been sunk on the property. The "shaft" of the old works was down 750' (?). There is a modern 10-stamp mill with Johnston concentrators on the property.

1896 – Perrin or Slate Ledge

Worked intermittently for many years, with production noted in 1868 and 1890-1891, and actively worked in 1893-1894. Vein opened by incline shaft (winze) started in the tunnel, 900' in from portal. Incline is sunk 300' on the vein. On the tunnel level, large quantities of ore have been stoped from above it.

1915 – Slate Ledge

Five miles from Grass Valley, at 1840' elevation. Worked through an adit, 793' long, to a station where an incline has been sunk 347' below; the adit continues for 1000' on the other side of the incline. Four drifts extend east from the incline below the adit level, to distances of 954', 636', and 540'. Most of the vein above the main tunnel is stoped out. An upraise from the shaft (incline) to the surface permits use of water power for hoisting and pumping; water is taken from irrigation ditches on the property, fed from Wolf Creek. One half-mile from the mouth of the adit is a 10-stamp mill, with 750-lb stamps; also furnished with two Johnstone concentrators. The mill is run by 6' hurdy wheel.

1918 – Prudential

Worked at intervals since early days. Consists of an 1800' tunnel; at 900' in from portal there is a 300' winze on the vein. This work done prior to 1896. Not operating in 1914-1915; as of 1915, there are plans to install considerable equipment and "work along broad lines."

1941 – Prudential (Selena, Perrin & Co. or Slate Ledge)

Earliest available record of work indicates production stated late in 1867. The mine was then called the Selena. By mid 1868, an incline had been sunk 125' on the vein. By 1869, the incline was 370' deep. There are intermittent production records from 1868 to 1893, and 1909 to 1912. The adit is 1793' long, with ore stoped for about 1000' above the adit level. At 793' in from adit portal, an inclined winze was sunk 347' and levels were run east 954', 636', and 540' in 1896, and a west drift 200' in 1904. A 10-stamp mill was located ½ mile from the adit.

GRASS VALLEY AND VICINITY

CENTENNIAL MINE,

Located two miles southeast of the city of Grass Valley, adjoining the Osborne Hill mine, and on the same lode. Was first worked in 1852, and has been successfully operated by several different companies from that time until the present date. Depth of mine, 650 feet; total amount of gold produced, \$500,000; dividends paid, \$200,000. This valuable property is now owned by a Sacramento company, who are developing the mine in a systematic manner. A. W. Stoddart, who is acknowledged to be one of the best practical miners in the county, is superintendent, and Major John N. Larkin, of Sacramento, is president of the corporation.

THE CONLON MINE

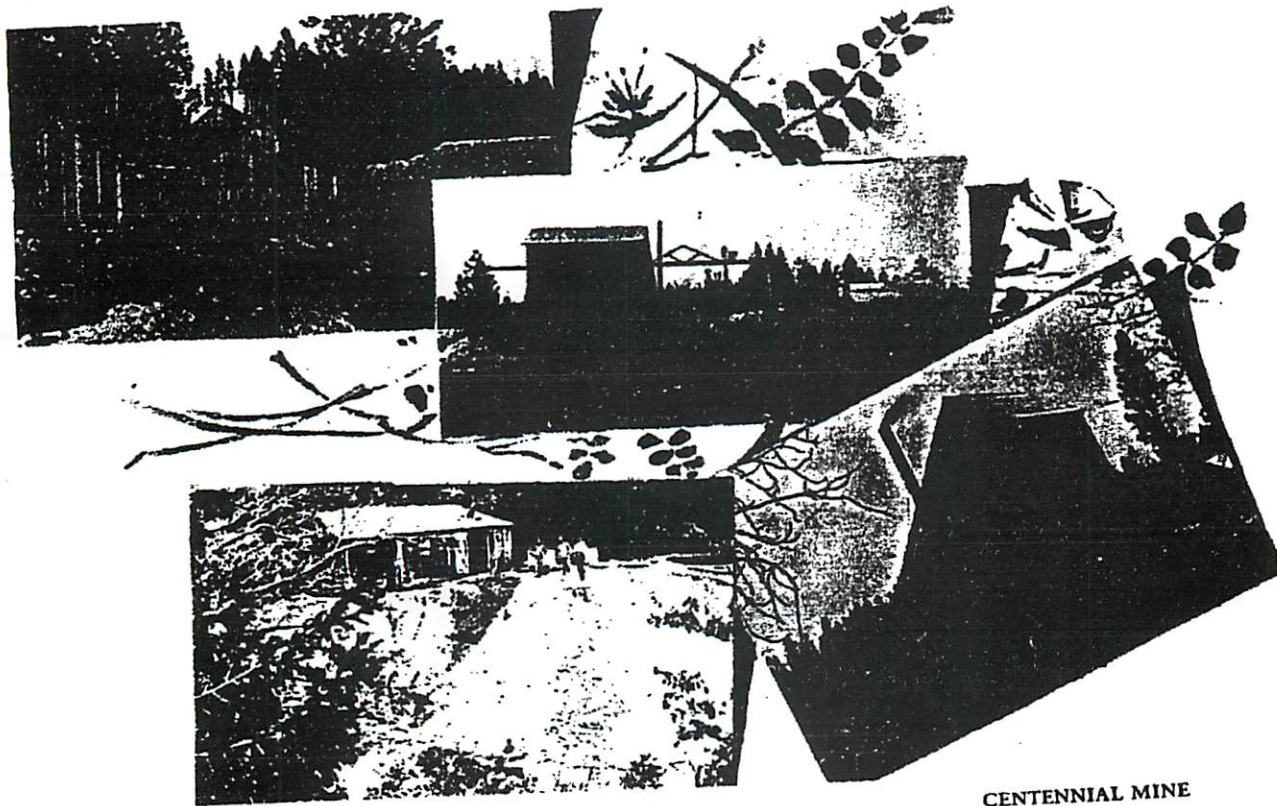
Is situated on Osborne Hill, about two and a half miles from Grass Valley, and adjoins the Osborne Hill mine. On the property is a fine hoisting works and ten-stamp mill, with rock breaker and ore feeders, which are very complete. This is a very valuable property. The shaft is only down 200 feet, but they expect to sink it to a depth of 500 feet the coming season. The company's office is in San Francisco, 26 Montgomery Street. The officers are: J. B. Duggan, President; T. H. Hurlick, Treasurer; Geo. Beebe, Vice President; Thos. Lynch, Secretary; J. A. O'Connor, Superintendent.

SLATE LEDGE MINE.

The Slate Ledge mine is located on Wolf Creek, five miles below Grass Valley. The mine possesses 1,500 feet on the vein, and contains forty acres of surface ground. There is a tunnel on the property, which runs a distance of 2,000 feet. Rich shoots of ore were encountered in this tunnel. The mine is now being developed through a shaft which is 250 feet in depth. The ore averages \$20 per ton. There is a ten-stamp mill on the property which is owned and operated by the Perrin brothers.

GRANITE HILL MINE.

The Granite Hill mine is situated in a part of the mining district which is famous for its richness in gold-bearing quartz. The company was incorporated in 1893. The shaft is 400 feet deep at present, and the works are run by water power, which is free, as the water is taken from Wolf Creek, which flows close by the mine. This property is regarded as one of the best prospects in the district. J. F. Cooper, of Sacramento, is the president of the company, and R. D. Waggenor is the superintendent.



GRANITE HILL MINE
SLATE LEDGE MINE

CENTENNIAL MINE
CONLON MINE

In the former workings being wholly upon the main shoot, timber is obtained from 500 feet below the tunnel.

...ing 13 tons per hour on three Henday pans, ...
concentrates are saved on a hurdy-gurdy wheel being used ...
mill is now run by water, a free power is disclosed.

hoisting, water being used to raise the old incline, put in hoisting and haulage road and hoist intention to reopen the old incline, below tunnel level.

power thus being obtained from the depth of the drain tunnel.

JACK RABBIT NINE.

The shaft has an inclination of 55° from the horizontal ground; it intersects the horizontal axis at the point

NEVADA COUNTY.

level is run. The water is handled by a 6-inch pump running seven strokes per minute. The water is pumped from the well into a 6-inch pipe.

duced from the property are estimated to be 1.3 million tonnes of high-grade sulphurets in addition to 1.3 million tonnes of low-grade material.

The entire plant is erected on a 16-foot boiler supplies the steam. The entire plant is erected in an admirable order.

The wood is cut thick enough for the ordinary cage. The somewhat unusual pitch of the snail—two degrees in the back, three in the front—makes it a little more comfortable than the ordinary cage.

seven underground.
ing the last year.

MERTINAC BLINE.

east and west, dipping north at an angle of 25° to 30°. The thickness of the ore varies from 18 inches to 3 feet. Both walls are slate. A drain tunnel is driven westward upon the vein.

ground sloped is 300 feet. Spruce poles are the timbered the entire distance. feet; it is timbered the entire distance.

150

276

Four levels are turned from this main incline, as follows: The first, 150 feet from the surface, extends south 430 feet, and connects with the south incline, extending north from the main shaft 240 feet; the second, 100 feet lower, extends south 370 feet, and also connects with the south incline, extending north from the main shaft 105 feet; the third, 50 feet lower, running north from the main shaft 265 feet and north 24 feet; old shaft, running north from the main shaft 265 feet and north 24 feet; lower, or at a depth of 300 feet, runs south 265 feet and north 24 feet; the fourth, or lowest, at a depth of 400 feet on the incline, runs south 110 feet and north 20 feet. The shaft is sunk 30 feet under the fourth level. There is one ore shoot 700 feet in length. The greatest length of ground stoped is over 600 feet. The ground already stoped is as follows: From the 300-foot level to surface between the two incline shafts, the 400-foot level thus giving 100 feet of "backs" between those points; from the 150-foot level north of main incline to surface, all ground north of the 150-foot level north of main incline being untouched. South of the shaft and below this level being untouched. The 400-foot level south drift is at present in no work has been done. The 400-foot level south drift is at present in no work has been done. The vein averaging a foot in from the shaft 110 feet, in ore all the way, the vein averaging a foot in size.

Sixty feet south of the shaft is a raise to the size of the vein. The raise is in progress. At 40 feet in ore, the vein averaging a

The 400-foot level north drift is in 20 feet from the 100-foot level. The 400-foot level is but of good ore. The 400-foot level is rich specimens; the

This mine has recently produced wonderfully little under one foot of waste material.

A general run of the remaining ore is also said to be of good grade.

The A-12-inch plunger pump handles the water with ease, raising it to the surface through a drain tunnel, which intersects the main incline 65 feet from the pumps elevating station.

About 25 inches of water is raised from the mine, the pumps elevating heavy-duty Giant No. 8 powder is the explosive used.

Over 900,000 ounces daily. The quartz carrying heavy ribbons of gold relatively rich

The character of the ore is heavy, and showing at times extremely coarse gold disseminated through, and pumping plant upon the mine; there are a substantial hoisting and pumping plant upon the mine; specimen ore.

The new 12-inch horizontal engine does the pumping. The old 12-inch horizontal engine generates the necessary power. A 50-inch by 16-foot boiler generates the steam. The mill is being reduced to a mill about one eighth of a mile long. The mill is being reduced to a mill about one eighth of a mile long.

The ore is at present not owned by the company, and is distant. The mill is not owned by the company, and is distant. The mill is not owned by the company, and is distant.

The system of ventilation in the mine provides an ample current of air unaided. Nine and one half per diem suffices for pumping and hoisting, costing \$3 to \$3.50 per cord. There are employed underground, five men on surface work, and

Thirty men are employed, wages are \$8 per an-
four in the mill. Miners

PENNSYLVANIA MINES

The dimensions of the claim are 2,860 feet by 200 to 400 feet in width. The width of the vein varies from 4 inches to 2 feet, with an average thickness of about 1 foot. The inclosing formation is a syenite in throughout of about 1 foot. The inclining shaft 440 feet in length, through the walls. The mine is opened by an incline shaft 440 feet in length, through the walls. The mine is opened by an incline shaft 440 feet in length, through the walls. The inclination varying from 14° to 38°. The dimensions of the shaft, the lowest at a depth of 400 feet, running north 150 feet.

present developments have revealed one shoot of ore, 350 feet in length as far as run on.

The water is very light, a one-inch pail, on a 100-foot mine, keeps the mine clear seven strokes per minute for eight hours per day, keeps the mine clear of water. Safety Nitro No. 2 is the explosive used.

There is a substantial hoisting, pumping, and crushing plant upon the property, so arranged that the ore coming from the shaft is dumped directly into the ore bins. The ore is reduced in a five-stamp mill, and in character is ribboned quartz, containing pyrites and galena in addition to free gold. The stamps weigh 750 pounds each, and drop 6 inches slightly-one times per minute; the duty per stamp is $1\frac{1}{2}$ tons per day. Chrome steel shoes and dies are used; the ore is crushed through a No. 30 brass wire screen. The apron plate is 4 feet 8 inches, and the sluice 18 inches wide by 12 feet long. An inside battery plate 4 inches wide is used. The ore is fed from a Hendy feeder; two thirds of the amalgam is recovered from the battery and one third on the plate. The concentrates are saved on a Woodbury concentrator. The entire plant is run by steam power, one 8-inch and one 10-inch engine furnishing the power. When everything is running full, including the mill, but one and one half cords of wood are burned per day. A large amount of work has been done during the year, including 350 feet of shaft sunk and several hundred feet of drifts run. Eighteen men are employed.

CENTRAL NORTH STAR MINE

15 MRE - 3

This mine is situated about 2 miles south of the town of Grass Valley at an altitude of 2,480 feet. It consists of two claims, 1,500 by 600 feet and 1,200 by 600 feet, respectively. The property is the eastern extension of the North Star Mine. At present the mine is sinking a vertical shaft in order to intersect the extension of the North Star vein, whose course is east and west, dipping north at an angle of 20°. The formation is a diabase in both walls. The shaft at date of visit had a depth of 170 feet, its dimensions are 4 feet by 10 feet in the clear, and it is well timbered the entire distance. No levels are as yet turned. Very little water is coming in, but ten barrels per shift being hoisted. Pumping machinery is, however, all in position, and arrangements complete to put in a 6-inch pump whenever needed. Seven feet of shaft are sunk per week, at a cost for labor of \$16 per foot.

The formation passed through is diabase the entire distance. The mine is equipped with a substantial hoisting and pumping plant, containing a 7-inch hoisting and a 10-inch pumping engine. One hundred of wood is consumed per day.

BLATE LEDGE MINE

The Slate Ledge Mine is situated on Wolf Creek, 5 miles from the town of Grass Valley. The property has an extent of 1,500 feet upon the vein, and contains 40 acres of surface ground. The course of the vein is east and west, dipping south at an angle of 33° , it averages 1 1/2 inches in width. The formation throughout a greater portion of the vein is a diabase, but in the eastern portion of the ground this changes to a diabase, but in the eastern portion of the ground this changes to a contact formation, the diabase underlying the vein, while the hanging wall and the country rock is a granite, the vein turning more to the

out the main vein about 15' yet below. Two men are at work. A. M. Jeter, of Nevada City, owner.

Red Point Mine (Quartz).—It is $\frac{1}{2}$ mile N. W. from Washington, across the Yuba River, at 2,650' elevation. The formation is an altered rock in the vicinity of the slate and serpentine contact, in which there is a gold-bearing fissure striking W. of N., nearly vertical, with no quartz surface work and an 80' tunnel comprise the development. Two men are at work. W. E. Yeaw and E. A. Langford, of Washington, owners.

Reward Mine (Quartz).—See our XIIIth Report, p. 199. It is $\frac{1}{2}$ mile S. W. from Nevada City, at 2,600' elevation, and comprises two full claims east of the Providence Mine. The 16" vein strikes N. and S., and dips 36° E., in grano-diorite. On the pay-shoot, which pitches apparently north, the quartz is said to contain 5% of sulphurets of high grade. The better portion of the sulphurets ore is hand-sorted, sacked, and shipped. The 5' x 8' double-compartment main shaft is 400' deep, and supplied with hoist and pumps driven by steam furnished from a 60 H. P. boiler. The pumps consist of an 8" plunger and a 6" lift. A second temporary 5' x 6' shaft has been sunk to a depth of 300', with a 15 H. P. steam hoist to tap the drain tunnel of the California Mine adjoining, from which point a drift has been run 600' N., where an upraise is being made to connect with the bottom of the main shaft. This drift, which, in connection with the California's adit, will serve as a drain tunnel, shows a continuous vein with a pay-shoot of high-grade ore 250' long. No work is being or will be done from the main shaft at present, until ventilation is made through the upraise, when drainage and ventilation for this part of the mine will be secured. No ore is crushed at present. An incorporated company, care of Union League Club, San Francisco, owner; S. W. Backus, secretary; J. T. Gribble, of Nevada City, superintendent.

Rising Sun Mine (Quartz).—It is $\frac{1}{2}$ miles N. E. from Washington, at 4,400' elevation. The vein strikes W., and dips E., in granite. A shaft is down 25', showing a 3' vein, and at the shaft-mouth a tunnel has been run 60' on the vein. Idle. R. Maloney, of Washington, owner.

Rocky Bar Mine (Drift).—See our XIIIth Report, p. 199. It is $\frac{1}{2}$ mile E. from Washington, at 2,650' elevation, and comprises 8,000' on the channel of the South Yuba River. Since our last Report 250 sq. ft. of the channel have been worked, and a 1,000' drift run up and across the channel. The derrick, with 75' mast and 65' boom, is worked by a 16' overshot wheel, using 300 miners' inches of water, from Poor man's and Cañon creeks, brought through 4 miles of ditch. Six men are employed. J. O. & E. A. Hayes, of Washington, owners.

Rocky Bar Mine (Quartz).—See Massachussets.

Rocky Bar Mine (Quartz).—See our VIIth and XIIIth Reports, pp. 483 and 200. It is on Osborne Hill, 2 miles S. E. of Grass Valley. Idle.

H. Sylvester, of Grass Valley, owner.

Rose Hill Mine (Quartz).—It is in South Grass Valley, at 2,600' elevation, and comprises 12 acres of ground on two parallel N. and S. ledges, one pitching E. and the other W., in a grano-diorite formation; they vary in width from a few inches to a couple of feet. A 860' tunnel taps the ledge and is intersected by a vertical shaft 120' deep, from which several hundred feet of drifts have been run. There is a 3-stamp double-discharge mill, with 950-lb. stamps, run by a gasoline-engine, to be changed to electrical power later. It is furnished with a swinging

arm, and crushes 5 tons in twenty-four hours. ——— R. D. company, of No. 320 Sansome Street, San Francisco, owner; R. D. company, of Grass Valley, superintendent.

San José Ravine Mine (Quartz).—See Glenn.

Sanders Mine (Quartz).—See Electrical Mining Co.

San José Mine (Drift).—See our XIIIth Report, p. 201. It is on Deer Creek, 6 miles E. of Washington. Idle. An incorporated company, of San José, owner.

Santa Mine (Quartz).—It is $\frac{1}{2}$ mile S. of Grass Valley, at 2,475' elevation, and comprises 91 acres of patented land. Five veins have been found crossing the property, varying from 1' to 5' in thickness, supposed to be extensions of the W. Y. O. D., Pennsylvania, Bullion, and Diamond mines. The general strike is N. and S., and they all pitch W., and are from 150' to 300' apart, in a grano-diorite formation near the slate contact. At the north end of the claim, between two veins, is a 185' vertical shaft, furnished with a steam hoist. On the south side of the claim, $\frac{1}{2}$ mile distant, is a tunnel, cross-cutting 400' and then turned 400' on the vein, showing 2' of quartz well mineralized. One hundred feet from the breast is a cross-cut 700' long to a solid body of sulphurets 30' wide. This tunnel gives 60' of backs, all sloped to the surface. Idle. Mrs. F. Sawyer, of Grass Valley, owner.

Santa Mine (Quartz).—It is on Osborne Hill, $\frac{1}{2}$ miles S. E. of Grass Valley, at 2,700' elevation, and comprises 2,200' by 300' at one times Valley, and 600' at the other, patented ground. The 4' to 10' vein strikes W. of N., and dips 45° W. between diorite walls. The quartz is said to carry 1½% sulphurets of a good grade. The new double-compartment incline is 105' deep; the old incline was 250' deep; several shaft prospects have been sunk to water-level. There is also an 800' main tunnel. Idle. J. Bennellack et al., of Grass Valley, owners.

St. John Mine (Quartz).—It is $\frac{1}{2}$ miles E. from Washington, at 4,300' elevation. The vein, from 3' to 4' wide, strikes N. and S., and dips E., in porphyritic granite. It has been worked through on the vein. Idle. C. O. Anderson et al., of Nevada City, owners.

State Ledge Mine (Quartz).—It is $\frac{1}{2}$ miles S. of Grass Valley, at 1,840' elevation, and comprises 40 acres. The vein has an E. and W. course and dips 30° S., averaging from 16" to 18" in width, between slate and diorite walls. The quartz is said to carry 2% sulphurets. The vein has worked through a tunnel, 798' long, to a station, where an incline has been sunk 347' below; the tunnel is continued for 1,000' on the other side of the incline. Four drifts extend E. from the incline, below the tunnel level, to distances of 954', 636', and 540', showing three ore-shoots pitching west. Most of the vein above the main tunnel is sloped out. An upraise from the shaft to the surface permits of the use of water-power for hoisting and pumping, with a 4' hurdy wheel, which takes the water under 100' head. The 4" bucket- and lift-pump has a 4' stroke and makes 10 strokes per minute. The water is taken from irrigation ditches belonging on the property, fed from Wolf Creek. One half mile from the mouth of the tunnel is a 10-stamp mill, with 750-lb. stamps, which crushes 1½ tons per stamp, and is furnished with two Johnstons concentrators; the whole is run by a 6' hurdy wheel under 30' head. Seven men are employed in the mine and two in the mill, when running.

Sleeping Beauty Mine (Quartz).—It is 3 miles N. W. from Moore's Flat, at 3,100' elevation, and comprises two claims on the Middle Fork of the Yuba River. The 1' to 6' vein strikes N. W., and dips 40° S. W. 75' in the greystone formation. The vein carries a large percentage of arsenical pyrites, and above water-level the quartz carries coarse, heavy gold. There are two tunnels, one at each end of the claim; the longer one is 180', and has a 30' incline below it, and an upraise and slopes to the surface. The second tunnel is on a lower level, farther up the river. The richest ore is worked in a hand-mortar. Two men are prospecting the ground. Rander & Wisand, of Moore's Flat, owners.

South End Mine (Quartz).—See Goodall Consolidated.

South Idaho Mine (Quartz).—It is 1 mile E. of Grase Valley, at 2,560 feet above sea level. The mine is in a quartzite, and is at an elevation, and comprises 2,300' by 600'. The vein trends S.E., running parallel with the Idaho, and dips E., between slate walls. There is a vertical shaft, 100' deep, with a 20' cross-cut to the other side of the vein and a short drift of 15' along the foot-wall. The ore is said to carry 4% of sulphurets. A 12' cross-cut at the 60' level did not reach the wall. The hoist is a horse-whim. Two men are at work. D. C. Webb.

tor, of Grass Valley, owner.

*Spanish Mine (Quartz).—*See our VIIIth and XIIIth Reports, pp. 443 and 200. It is 3 miles W. from Washington, at 2,700' elevation. Since our last Report the mill has been moved 300' down the hill to the mouth of the lowest tunnel, and 4 new Huntington mills and 10 stamps added, bringing the mill capacity up to 100 tons per day. All the mining is carried on through the deepest tunnel. Water-power is used under 800' pressure. Twenty men are employed. F. W. Bradley, of Wardner, Idaho, owner; D. Johnson, of Washington, superintendent.

Spanish Mine (Quartz).—See our XIII and XIII Reports, pp. 292 and 300. It is on Woods Ravine, 14 miles N.W. of Nevada City, at 2,500' elevation. The vein strikes N. and S., in granite, and is over 5' in width, carrying low-grade quartz, heavily sulphuretted. Since our last Report a 10-stamp mill has been erected and a hoisting and pumping plant put on, sufficient to go 1,000' in depth. The mine is opened with a 400' incline. Two men are pumping water. R. R. Colgate, of New York, owner; A. L. Berghie, of Nevada City, superintendent.

St. Louis and Wide West Mine (Quartz).—See Alpine

Stacey Mine (Quartz).—See Glenn. **Stanford (Oro Fino) Mine (Quartz).**—It is 4 miles W. of Nevada City, at 2,460' elevation, and comprises 2,200' by 600'. The vein strikes N. W. and dips N. E., changing from 50° near the surface to 25° below the 200' level. The fissure is partly filled with gangue, carrying short ore shoots of about 100' in length. The double-compartment 6 x 7' main incline is 315' deep, tapped 40' from surface by a 650' drain, and with levels below the adit, extending both N. and S., about 100' along the fissure. Ore for the mill is supplied from stopes between the second and third levels S. of the shaft. The 10-stamp mill has 350-lb. stamps, dropping 80 times per minute on 6" drop, crushing 10 tons on day shift only. The hoist and pump, as well as the mill, are run by water-power from South Yuba ditch; the former two with a 9' Pelton wheel under 170' head, while the mill has a 4½' Pelton wheel, and the four True ramblers a 2' wheel.

manager.
St. Louis Mine (Quartz).—See *Alpine*.
Sturteville Mine (Quartz).—See *Mass*.
Summit Consolidated Gold Mining Co.:
 S. of Nevada City, at 2,700' elevation, an
as India, Fortuna, Orleans, and Thomas
K.P., and dips S. W. in slate and diaphan
 of sulphurets, with ribbon quartz. It
 the old Fortuna shaft, 240' deep, is belin
 there is a steam hoist and pump on the shaft, and o men are employed;
 Englebright, Wagoner, et al., of Nevada City, owners; G. A. Nihell, of
 Nevada City, superintendent.

NEVADA CITY, CALIF.—See **GRAY EAGLE**
SOUTH AFRICA (QUARTZ).—See **GRAY EAGLE**

Nungui South Mine (Quartz).—See *Way*, 1891, p. 16. It is 1½ miles S. of *Wash-Secret's Flat* (*Tung Kow Mine* (Placer)). The gravel bank is 15' high, impleton, and comprises 10 acres of gravel. The gravel-power derrick carrying many heavy bowlders, and requiring a water-power through with a 55' boom. The gravel requires blasting, and is washed through 10 boxes set on a 4" grade, lined with wooden blocks; water is taken from *Jephson Creek*, the season lasting five months. Eight Chinese, now employed, are at work.

ore, are at work.

Synthetic Mine (Quartz).—It is in Sec. 2, T. 15 N., R. 8 E., 24 miles S. of Grass Valley, adjoining the Allison Ranch Mine, at about 2,000' elevation, and embraces the *Golden Chert*, *Great Eastern*, and *New Hope* claims, containing 68 acres in all. The vein strikes N. W., with a 40° E. dip that passes through the first two claims, while the latter has a parallel vein with a westerly dip, which shows in the bed of Wolf Creek. Idle. Wm. Berry et al., of Grass Valley, owners.

(Tech. Idio. Wm. Berry et al., of Grass Valley, Cal.)—An incorporated company has *Treadwell (Grass Valley) Tunnel Co.*—An incorporated company has been formed, and preliminary surveys are being made for the purpose of running a deep tunnel to drain the mines in the vicinity of Nevada City and Grass Valley. The initial point for the mouth of the tunnel is 1 mile above Jones' Bar, on the south bank of the Yuba River. A depth of 1,400' is expected to be attained at the Providence Mine. G. Treadwell of Nevada City, manager.

TRUSS K&M MINE (Placer).—See Birect's Plat

Tung Kow Mine (Placer).—See **SWEETS'S LIST.**
Twin Sisters Mine (Quartz).—It is 2 miles S. of Eureka, at 8,100' elevation, and comprises two claims with parallel veins about 8" wide, striking N. and S., and dipping 45° W., between granite walls. It is a striking N. and a 20' incline and an open cut. Two men are at work. Prospect with a 20' incline and an open cut. Two men are at work. J. J. Hollister et al. of Graniteville, owners.

Holligan et al., of Graniteville, owners. *Union Mine* (Drift).—See our XLIII Report, p. 201. It is on Relict Hill, 84 miles from Bloomfield, at 2,560' elevation, and comprises 80 acres of ground. The bedrock tunnel is 2,000' long to the channel, which is 250' across, running E. and W., and is worked in breasts 6' to

There are 1.33 per cent of sulphurets, according to Phillips. Bean's Directory gives 3 per cent. These are rather low grade, being said to average \$50.

The Bourbon veins lie 500 feet west of the Norambagua, and the Shamrock 1,200 feet southeast of it.

THE FERRIN OR SLATE LEDGE VEIN.

For many years this vein has been worked intermittently and has been a considerable producer. In the reports it is credited with \$32,000 in 1869, \$5,000 in 1890, and \$13,100 in 1891. It was actively worked in 1893 and 1894. The vein is opened by an incline shaft started in the tunnel from Wolf Creek, 900 feet from its mouth, the total length of the tunnel being 1,800 feet. The incline is sunk 300 feet on the vein, which strikes east and west and dips 30° S. The country rock is chiefly diabase with some clay-slate, but the vein crosses the granodiorite contact 1,600 feet from the mouth of the tunnel. The ore ranges from \$15 to \$20 per ton, the gold rarely being coarse and averaging 745 fine. The sulphurets, of which there are 3 per cent, consist chiefly of arsenopyrite and contain about 3.25 ounces of gold to 2 ounces of silver per ton. On the tunnel level the pay shoot is continuous for 1,000 feet, and large quantities of ore have been stoped above it. Below the tunnel level the shoot appears to split into several branches inclining to the west, contrary to the usual rule for veins dipping south.

VEIN SYSTEMS OF PENNSYLVANIA, W. Y. O. D., AND THE WESTERN FOOT OF OSBORNE HILL.

GENERAL FEATURES.

The hills to the southeast of Grass Valley, usually referred to as the Kate Hayes and Ophir hills, are in an unusual degree shattered by jointing or sheeting, and numerous quartz veins are found parallel to these systems of dislocation. The most prominent vein system dips west at moderate angles, but there is also ample evidence of the existence of another system dipping east at about the same inclination, and there is excellent evidence of the contemporaneous formation of the two systems. The veins dipping east are best represented in the continuation of the system to the south-southeast near the southern limit of the sheet. The deposits lie chiefly in granodiorite, near the contact, while some of them are contained in the diabase. The gold is generally of high value, often coarse; the sulphurets are moderate in quantity; arsenopyrite is not generally present.

Exceptional veins are the nearly perpendicular Golden Treasure, striking north-northeast, and the Little Diamond, which dips 45° S.

KATE HAYES VEIN.

Located on the summit of Kate Hayes Hill, 4,000 feet south of the Grass Valley post-office, this vein was worked considerably thirty years

water tank. News items indicate that some ore was mined in 1930, with 4 men employed.

Marsman Company of California in 1939 took a diamond-drilling outfit to Meadow Lake district and put down 7 drill holes to prospect the Great Western, Great Eastern, Excelsior "O" vein, Excelsior "X" vein, the Fraction claim and the Excelsior veins below the old Hartley workings.

In a report to J. O. Enberg, president of the company, George H. Newman, the company's geologist, stated in part as follows:

"Of the 7 holes drilled, 4 were negative in results, 1 was encouraging and 2 mildly so. The results of drilling do not substantiate the original representation of the Meadow Lake orebodies as being large well-defined veins of great strength and resistance with possibilities of producing large tonnages of medium to low grade ore . . ."

In the 32nd report of the State Mineralogist, pages 189-204, A. L. Wisker reviewed the much-debated subject of the possibilities of Meadow Lake district, and the reader is referred to his article for further information.

Mt. Vernon (Home or Native Son). It is 6 miles north of Nevada City in sec. 20, T. 17 N., R. 9 E. Considerable work has been done in the past but there is little record of production. An inclined shaft has been sunk about 400 ft. with levels reported at 220 ft. and 400 ft. On 220-ft. level a drift was run east 100 ft. and a crosscut was run 75 ft. to the Swede vein. On 400-ft. level is a crosscut 75 ft. long and a drift 30 ft. on the Old Home vein. A drain tunnel has been run 1900 ft. from the slope south of Yuba River and will give drainage to an inclined depth of several hundred feet below present shaft bottom. This work was done at different times between 1900 and 1913. In 1909, a few tons of \$10 ore was milled. In 1938, a lease was given to Thomas Brown who reported saving \$53 from 3 tons crushed in an arrastre.

The veins occur in granodiorite and are reported to range from 6 inches to 3 ft. in thickness.

Normandy-Dulmaine. These claims were described in detail in the 1918 report and later work was mentioned in the 1930 report. The claims are near the Alcalde in Deadman's Flat district and in 1933 they were under the control of Mattie Gold Mines Company, but this outfit did no new work.

The Dulmaine vein stands nearly vertical and strikes N. 25° W. The deepest shaft, 350 ft. deep, was sunk on it. The fissure was as wide as the shaft in the upper levels but the quartz is only 12 inches to 18 inches wide. The Normandy vein, parallel in strike to the Dulmaine and 700 ft. east of it, has 2 branches 40 ft. to 50 ft. apart on the northern part of the Normandy claim, and these dip 35° W. and 65° W., diverging at increased depth. Besides the shallow workings about 1900 ft. of drifting on the Normandy vein is reported from the Dulmaine shaft. No orebodies were found, so far as known. The country rock is amphibolite schist. Still another vein called the West Normandy, crosses the veins mentioned on the south end. This strikes east and dips north.

Like the other claims in this district, these produced good ore from shallow workings but the amount is not definitely known; \$100,000 output is claimed.

Northern Bell and Thomas patented claims are on the south end of Osborne Hill, adjoining the claims of the Goodall Consolidated on the south in secs. 1 and 12, T. 15 N., R. 8 E. This property was worked a short time in the 1880's. An item published in June 1882 indicated that 60 tons of ore was taken out daily in the latter part of May, 1882, and that \$33,706.39 was produced in May up to the 25th. No further reference can be found. A shaft is said to have been sunk 130 ft. and 2 tunnels between 100 ft. and 200 ft. were run on the Northern Bell claim, which contains 11.99 acres and lies southeast of the Thomas claim (9.18 acres). The country rock is diabase.

Oakland Claim. Located 2½ miles southeast of Grass Valley, in sec. 1, T. 15 N., R. 8 E., in the Ophir Hill-Osborne Hill area; elevation 2800 feet. Owner, Mrs. ----- Hofheinz, San Francisco. Patented. The history of the Oakland claim is one of intermittent operations from the early 1850's to 1890. The production during that time is claimed to have been about \$90,000. A vein with northerly strike, average dip 40° W., and width from a few inches to 2½ feet outcrops the length of the claim. The fissure is well defined and the ribbon quartz it contains is typical of the district. No recent development work has been done.

Ocean Star Mine is 2 miles east of Washington on the of Yuba River. The last previous operations were between 1918. The ore milled during that period yielded from \$11 a ton. The last work was done by Columbia Consolidated which held the mine and several others nearby, and the ex. of production are uncertain, but the best ore was milled in 1915, the larger part of it yielding about \$5 a ton (gold \$20.67 an oz.).

The shaft was sunk 300 ft. When unwatered in June, Elmer R. Berg and associates of Reno organized as Colum Gold Mines, Inc., it was found that besides the mining of the 100-ft. level, stoping had been carried 30 ft. above the 200 leaving 60 ft. of backs. The drifts on 200-ft. level extend 40 and 120 ft. south. The ore shoot rakes south, according to Clark Waite, and the shaft is claimed to pass out of it between the 200-ft. and 300-ft. levels. No drifting has been done on the 300-ft. level to check this, but between these two levels the quartz in the fissure is said to pinch to 6 inches with 5 ft. to 6 ft. of filling.

The German adjoining on the south, and the Columbia claims are included in the holdings leased to the above company.

Prudential (Selena, Perrin & Co. or Slate Ledge). The earliest available record of work here indicates that production started late in 1867. The mine was then called the Selena. By the middle of 1868, an incline had been sunk 125 ft. on the vein and it was said that production had been going on 8 months. By January, 1869, a total of 1001 loads of ore had yielded \$23,000, averaging about \$30 a ton. The incline was then 370 ft. deep, and 8 men produced 16 tons of ore

a day. In October, 1869, it was stated that \$11,200 was produced at a total cost of \$2,058. The following fragmentary record of output came from contemporary news items:

Jan. 1873	4 days' run gave \$1,377 on plates
Oct. 1873	10 men in 3 weeks \$1,600
Dec. 1873	\$5,000 in gold from ore costing \$900 to mine and mill
July 1874	28 loads yielded \$572 free gold on plates alone
June 1883	17 loads yielded \$2,482
Mar. 1884	73 loads yielded \$2,301
June 1884	42 loads yielded \$2,184
Jan. 1887	24 loads yielded \$816
In 1890 produced	\$5,000
In 1891 produced	\$13,104
In 1893 produced	\$24,500

In the last period of operation, 1909 to 1912 inclusive, 1170 tons yielded only \$5,141.

The mine which is in the canyon of Wolf Creek, 5 miles south of Grass Valley, was opened by an adit 1793 ft. long. The vein strikes east and dips 30° S. It lies in slate and greenstone to within 200 ft. of the face of the adit where it enters granodiorite. (Ore was stoped for a length of about 1000 ft. above the adit level. At a point 793 ft. from the portal, an inclined winze was sunk 347 ft. and levels were run east 954 ft., 636 ft. and 540 ft. by 1896 and a west drift was 200 ft. long in 1904. The work done since is not known. Below the adit the ore shoot is said to have forked into several small branches, raking west. The width of vein has varied from 4 ft. in the upper levels to 18 inches in the bottom. Concentrate, largely arsenopyrite, forms 3% to 6% of ore and is low grade. There was a 10-stamp mill $\frac{1}{2}$ mile from the adit.

Reward Mine. This is on the eastern branch and near the south end of the Reward-California-Gold Tunnel-Pennsylvania vein. While the California and Gold Tunnel mines were opened at very early dates, the development of the Reward was delayed until the 1890's. In 1893 the inclined shaft was only 150 feet deep. In sinking it, so much water was encountered that it was decided to run a drain tunnel. This was run from Deer Creek a distance of 2,400 feet and was the 400-ft. level. Sinking was then resumed and early in 1898 reached an inclined depth of 700 ft. A 2-stamp mill was put in operation. In February, 1898, they cleaned up \$6,000 from ore that yielded \$27 or more a ton. The thickness of vein was reported from 7 inches to 12 inches. On the 500-ft. level it was said to have been 9 inches thick and to have carried a streak composed of 60% sulphides which assayed \$225 a ton. This was shipped to a smelter. Usually the sulphides formed 41% of ore and assayed \$180 to \$200 a ton.

Rusty Claim. In SE. $\frac{1}{4}$, sec. 21 T. 18 N., R. 13 E. in Meadow Lake district. L. C. Jackson, R. 7, Box 4424, Sacramento, reported that in 1935 he operated a Tetrault mill on ore from this claim and sold a few hundred dollars worth of gold. So far as known this is the only recent gold production from that district.

Spanish Mine. Owner, San Francisco Commercial Company, 1022 Crocker Bldg., San Francisco. Three miles north of Washington. This old mine, known as the place where the late F. W. Bradley and P. R. Bradley gained early experience and made a good record in the cheap

handling of low-grade ores, has been described often in our reports. Since the 1930 report, a great deal of work has been done.

A selective flotation plant of 50 tons capacity was put in operation in April, 1931. This was operated for nine months' on ore from No. 4 and No. 16 tunnel stopes, which "ran from \$3 to \$6 in gold, 2 to 3 oz. silver, 0.6% copper, 1.5% lead and 2% zinc. Five different concentrates were produced: copper, lead, zinc, iron and barite." Mine work stopped in November, 1932, but was resumed in 1933. No. 16 tunnel (elevation 3,022 ft.) was extended to a length of 5,676 ft. northward on the vein and No. 4 tunnel, 255 ft. above No. 16, is 1,803 ft. long. The mill tunnel at the old Spanish pit workings 580 ft. above No. 4, runs 689 ft. north.

According to Harden, from whose article these notes are summarized, an orebody averaging 0.26 oz. gold and 3.5 oz. silver was developed at the Barito Mine which is 8,500 ft. north of and 1,500 ft. above No. 16 portal. (See our 1930 report.) An aerial tram was built in 1933 to bring this ore to the mill and a 50-ton cyanide plant was put up and began treating the oxidized ore in October, 1933. When fresh sulphide ore was found at depth, a combination of flotation and cyanidation was used, as shown in Harden's flow sheet. The flotation concentrate was shipped to a smelter. The flotation tailing was cyanided. The mill capacity is 80 tons a day and treatment cost as reported by Harden was \$1.445 a ton.

In 1938 the mine produced 22,990 tons of ore which yielded 4,542 ounces of gold, 45,164 ounces of silver, 234,440 pounds of lead and 114,963 pounds of copper. Recently it has been worked on a small scale by lessees.

Spring Hill Gold Mines, Inc. 1915 Mills Tower, San Francisco. Stewart W. Marshall, general manager; C. C. Cushwa, superintendent. Prospecting has been going on at the Spring Hill Mine for a number of years, and a 100-ton plant employing flotation has been operated part time. In general, however, the results to date have not been satisfactory. The shaft has reached a depth of 1,900 ft. and preparations were being made early this year (1941) to handle some ore from that level. Many thousand feet of drifts and other prospecting have been done. About 10 men are employed.

Stockton Hill Mine. The Stockton patented claim contains 20.66 acres in N $\frac{1}{2}$, sec. 9, T. 14 N., R. 8 E., on North Fork of Wolf Creek, and mineral rights are also held on adjoining land, giving 1 mile on the strike.

Some work was done in early days, of which no record remains. In 1933, E. C. Boring and brother of Visalia began reopening an old shaft. In February, 1934, a strike of high-grade ore was made at a depth of 150 ft. After passing through various hands it came under the control of F. C. Lowry. In January, 1936, one shaft had been sunk 265 ft. An old shaft is 150 ft. south of this and 110 ft. deep. In the deeper shaft at 150 ft. some very rich ore was found and for a short time 45 pounds of ore crushed daily was said to yield about 50 ounces of gold, the total amount of the "strike" reported to be about \$20,000. After Lowry relinquished the lease and option on the mine, Stockton

¹ D. B. Harden. *Mine. & Met.*, Oct. 1935 A. I. M. E. Contribution No. 39.

Prudential Mine (Perrin and Slate Ledge). Owner, Prudential Gold Mining Company; Geo. W. Root, 2239 Atherton street, Berkeley, California.

Location: Grass Valley Mining District, Sec. 10, T. 15 N., R. 8 E., 4 miles south of Grass Valley. Elevation 2000'.
Bibliography: U. S. Geol. Survey Folio 18, Smartsville.

This mine is on agricultural patented ground situated on both sides of Wolf Creek, about four miles south of Grass Valley. It has been worked at intervals since early days. The vein which outcropped on the south bank of the creek, has been developed by an 1800' tunnel; 300' from the portal a winze was sunk 300' on the vein which has a northwesterly strike and a dip of 30° SW. This work had been done prior to 1896, but since that time considerable work has been accomplished. The mine was not operating in 1914-1915, and no information could be obtained regarding recent operations. The vein averages 18" in width and the ore above the tunnel level is said to have run between \$15 and \$20 per ton. For a distance of 1600' from the mouth of the tunnel the wall-rock is diabase, but beyond this point the vein passes into the area of granodiorite in which the Norambagua and other mines of the Grass Valley district occur.

In December, 1915, the mine was secured by Geo. W. Root, and it will be operated by a group of New York capitalists. It is planned to install considerable equipment and to work along broad lines.

Ragon Mine. Owner, Robert Nye, Grass Valley.

Location: Nevada City Mining District, Sec. 2, T. 16 N., R. 8 E., 2½ miles west of Nevada City by fair road. Elevation 2700'. 1½ miles north of the old Merrifield shaft of the Champion mine.
Bibliography: Cal. State Min. Bur. Rept. XIII, page 260. U. S. Geol. Survey, W. Lindgren, Prof. Paper No. 73, pages 125-132. U. S. Geol. Survey 17th Ann. Rept., pt. II, pages 1-242, 1896. U. S. Geol. Survey Folios 18 and 29, Smartsville and Nevada City.

The Ragon property consists of 2 quartz locations, known as the Ragon and Ragon Extension, and placer claims. All rights to the gravel channel have been traded to the Richland Mining Company, for rights to quartz veins under their ground. There is an area of 110 acres owned, and mineral rights under 80 acres obtained from the Richland Mining Company, covering a length along the lode of 2400 feet. The surface is rolling and there is no timber on the property. The vein was first discovered in working gravel in the old Empire mine in 1856. In 1870 Ragon's incline was sunk.

The vein is developed by a 210' inclined shaft, reaching a depth of 10' on the vein below bedrock, and a drift driven from the bottom of the shaft 100' to the north. A block 50' to 100' long, 70' deep and 4' in width has been stoped. Ore is supposed to have yielded \$8 per ton, recovered by amalgamation. No sulphides were saved.

The vein has well-defined walls and the quartz carries free gold,

northern extension of the Merrifield vein. The walls are granite. The vein when worked, was 4' in width, with a northwest strike and dip 45° NE. It has a proven length of 700', but can be traced at intervals both north and south for a distance of several miles.

The Ragon Development Company, in which R. H. Courtenay of Chicago and R. Chester Turner, general manager of the Bryans Consolidated, are interested, was organized in March, 1915, to take and develop this property in conjunction with the Mount Diablo claims and a head frame, electric hoist and pumping plant were installed in April, 1915. Idle in the latter part of 1918.

Redan. (See Sultana.)

Red Ledge. (See under Copper.)

Red Ledge Mine. Owners, R. F., T. B. and J. M. Williams of Washington; C. M. Cole, Washington, Nevada County. Bon W. F. Meeks, New York.

Location: Washington Mining District, Secs. 12 and 13, T. 17 N., R. 1 E., 1 mile south of Washington, Nevada County, 18 miles southwest of Nevada City. Elevation 2600-2600'.
Bibliography: U. S. Geol. Survey Folio 66, Colfax.

The Red Ledge property consists of the following locations: Red Ledge, Red Ledge Extension, El Capitan, Glacier Point, Brandt's Ravine, Washington, Chief of the Hills, New Year (fraction), Triangle No. 1 and No. 2 (fractions). The total area is 150 acres covering a length along the lode of 1 mile. The property is situated on the south side of the South Yuba River.

This mine was discovered by the present owners in 1907 and worked steadily from 1908 till 1914.

Development work consists of a crosscut tunnel of 50' to the north and a drift 400' south, reaching a depth below the outcrop of 250' a point 200' south of the crosscut adit a winze was sunk to a depth of 300' below the upper tunnel, and a 120' crosscut is being driven in 1000' and will have to be extended 200' farther to strike the lode.

The foot-wall of the lode is serpentine and the hanging wall is Calaveras slate. Between lies an altered zone of ankerite and dolomitic material traversed by numerous gold-bearing stringers and veinlets of quartz. The width of the lode is from 10' to 30' and malachite (chrysocolla) accompanies the rich pockets. In the oxidized zone, below the surface, no work has so far been done, the ankerite has been altered by weathering to an iron cap cut by quartz stringers carrying coarse leaf plates of gold. Some beautiful specimens of leaf and crystallized gold have been taken from this mine. The general strike of the lode is N. 15° W. and the dip from 70° to 80° E. The gold occurs in 'bur' and the so-called pay shoot is said to have been 70' in length.

NEVADA COUNTY MINING REVIEW

It is in the same formation as that of the Eureka and Idaho Mines, and the quartz is of similar character, containing sulphurets of a high grade. The property has not been worked to any great extent for twenty-five years, and not below the one hundred foot level. The ore is not high grade, that which was worked paying from \$5.00 to \$15.00 a ton. The property is owned by J. M. Lakenan and was successfully worked about two years ago by a Sacramento company, but the work was discontinued by reason of the superintendent embezzling the returns from the mill.

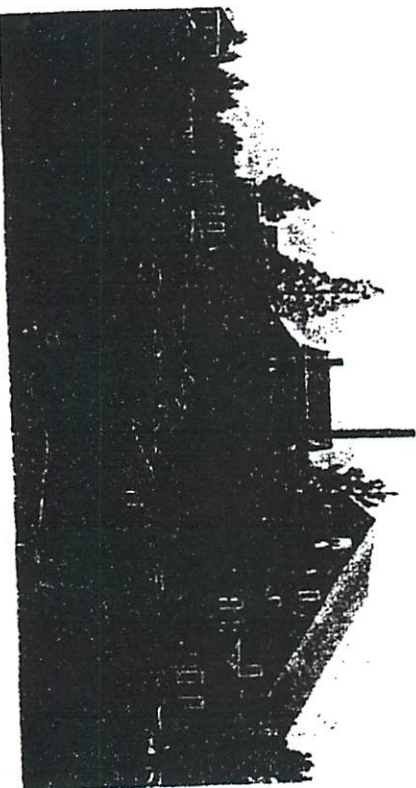
THE SLATE LEDGE MINE

This mine, also known as the Perrin, has a ten-stamp mill and has been worked through a tunnel. A new shaft has been sunk on the property and work is now being prosecuted vigorously. The shaft of the old works was down seven hundred and fifty feet and the quartz paid well. The ore averages from \$15 to \$20 per ton, and the sulphurets from \$20 to \$30 per ton. Some very fine quartz has been extracted from this mine. There is a modern ten-stamp mill with Johnston concentrators on the property. A. F. Perrin is the superintendent.

HARTERY CONSOLIDATED

This mine is equipped with a splendid plant, capable of sinking to a depth of 2300 feet. The shaft is down five hundred feet. Only one small drift has been run, in which there is a ledge varying from six inches to two feet in width. The mine is idle at present.

W. Y. O. D. MINE, GRASS VALLEY DISTRICT



superficial depth. There is a hoisting and pumping plant on the property, and work will be resumed at an early date, as the mine is in a most favorable location.

THE UNION HILL

Mine was worked extensively in the early days but is now idle. It was operated by a local company until 1870 with profit, when it was sold to an English company, who worked it for over a year. It was expensive to work on account of the large volume of water which had to be handled. The mine produced about a quarter of a million dollars, down to a depth of about three hundred feet, and the last month it was worked paid a dividend. The ledge was about five feet in size. George D. McLean now owns the property.

THE ORIGINAL HARTERY

Though one of our oldest mining locations, has been worked only to a depth of five hundred feet. It was located by Thomas Hartery in 1853, and has been worked periodically since that time, but not more than ten or twelve years continuous work has been spent on the property. Over \$300,000 in gold has been taken

out. Some of the richest specimens ever seen in this district came from the Hartery. When last worked there was a ledge about a foot in size in the mine. The present owners of this property are E. McLaughlin, Jos. A. O'Keeffe and Wm. Louzenheiser.

BRUNSWICK CONSOLIDATED MINE

This mine is one of the oldest locations in the district. It is situated about two and one-half miles from Grass Valley, on Union Hill. It was

THE GOLDEN TREASURE

Or Sauvee Mine, is situated about one hundred and twenty-five yards south of the W. Y. O. D. Mine, and has been worked only to a

Dec, 1867

DIXON'S, ONE MILE FROM KUREKA MINE.

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Sketch of the Mines
GRASS VALLEY TOWNSHIP DIRECTORY.

Not one-fourth part of the ore-ground owned by the company on the Norumbagus has been prospected, and the Bourbon ledge is as yet hardly opened, and yet the work of exploration on the former mine has been in progress for about twelve years. There is hence good reason to believe that this fine property will soon be productive, more productive than ever before. The advantage possessed by this mine in respect to drainage and the amount of ore available within a moderate depth, will be understood when it is remembered that (if the mean dip of 15° is preserved) before a vertical depth of five hundred feet under the drain tunnel is reached the incline shaft must be sunk over twenty-one hundred feet from the mouth of the shaft, measured on the slope. We find in this peculiarity as well as in the high tenor of gold, a compensation for the small thickness of the vein, which, it should be added, has all the characteristics of a true fissure vein, likely to continue unchanged in depth.

The Shamrock ledge runs parallel with the Norumbagus, being southeast of the latter about twelve hundred feet; located in 1830. Two thousand feet in claim. Vertical depth reached on vein, about thirty feet, and the ledge worked at various points for an entire distance of thirteen hundred feet. About seven hundred tons of quartz have been extracted, paying from \$14 to \$50 per ton; average pay, \$26 per ton. Ledge averages about ten inches in width. Owned by John Tierney, James Harrigan, Patrick Reilly, Patrick Hayes, and Anthony Copeland.

The Perrin ledge, owned by Joseph Perrin and B. F. Colvin, runs parallel with the Shamrock, and is now being profitably worked. Water wheel used for pumping and hoisting purposes.

The General Grant, same course as Shamrock, is a narrow vein, but is rich in gold. Last crumpling, a few weeks since, showed an average yield of \$50 per ton. Owned by George Little, James Harrigan, and others.

Gold Hill Mine.

This mine is on the hill after which it is named, and the claim calls for one thousand feet upon the vein. This mine has been celebrated for the large amount of gold which at various times since 1850 it has returned. It has had more than its share of the vicissitudes attending gold mining, but its history has not been recorded. At times the quartz has been knit together with gold which seemed to be distributed in this portion of the Massachusetts Hill vein in pockets. Those best able to know assert that there is a continuous communication in quartz between the workings on Massachusetts Hill and Gold Hill, leaving, apparently, no doubt of the identity of the vein. Mr. Attwood, who worked the Gold Hill mine for a length of time, informed the writer that at times the quartz was completely barren or contained less gold than would return the costs of mining in one thousand tons, which, without any assignable reason, would again yield an almost fabulous product. Vast sums in "specimens" are known to have been stolen by the miners during the run of these bonanzas, in spite of all vigilance. It was this mine that supplied the quartz for the so-called Gold Hill mill, memorable and venerable among the quartz mills of California. It is a popular belief that Gold Hill, during the fourteen years of its history prior to 1865, had returned not less than four millions of dollars in gold bullion. From September, 1865, until September, 1866, this mine was idle. Since then explorations have been resumed with good varying result.

This mine is explored by an incline shaft, which descends south $86\frac{1}{2}^{\circ}$ E (magnetic)

B. GAD'S, CORNER MAIN AND MILL STREETS, GRASS VALLEY.

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which is on the site of the old one, in 1804. First crushing of the new mill in August, 1804. Runs eight square-stem stamps, each weighing nine hundred and fifty pounds, the motive power being a thirty-horse power horizontal engine. Blanket process adopted, the interior arrangements being similar to those of the Sebastopol mill, with the exception that arastras are used for grinding sulphurets and amalgamating rusty gold instead of Norton's pans. The mill is capable of crushing sixteen tons of rock in twenty-four hours. Principally engaged on custom work. This mill, one of the best in the State, is owned by Robert Smith, John Smith, Edward Northey and Henry Morgan. The owners of this mill also own the Madison ledge, on Madison Hill, the Prescott, on Prescott Hill, the Fillmore and Daisy ledges, on Daisy Hill, all of which are now being worked.

Forest Springs Co.'s Mill,

Situated on Wolf Creek, near the Norambagua mine, four miles south of Grass Valley. This mill, which is moved by water power, running ten stamps, and capable of crushing fifteen tons of quartz in twenty-four hours, was built in 1851. Crushes rock from the Company's ledges—Norambagua and Lone Jack. The amalgamating is done principally in the batteries, copper plates and riffles also being used. The sulphurets here have paid as high as two hundred dollars per ton. Norton's pans are used for grinding tailings. The mill, which is constantly employed, is the property of the Forest Springs Quartz Mining and Lumber Company.

Perrin's Mill,

Owned by Joseph Perrin, and situated near Wolf Creek Station, about five miles south of Grass Valley, is a saw and quartz mill combined, and is propelled by water power. Was built in 1864; the stamps, five in number, being added the present year. First crushing in January, 1865. This mill, capable of crushing twelve tons of rock in twenty-four hours, is engaged on quartz from the Slate ledge, owned by Perrin & Colvin, and located near Forest Springs.

Merrimac Mill,

Located on Merrimac Hill, about two miles and one-quarter from Grass Valley, on the Merrimac mine. The mill was erected last year, and the first crushing was done in January, 1865. It has ten revolving stamps, weighing about eight hundred pounds each; is propelled by a thirty-horse power engine, and is capable of crushing fifteen tons of rock in twenty-four hours. The amalgamating, as in the Gold Hill mill, is done in the batteries. The principal portion of the coarse gold is found in the batteries, which are charged with quicksilver, the fine gold being collected on the copper plates, which are contiguous to the batteries. The mill crushes for its owners, and is not competent to do the required work, for which reason the proprietors contemplate putting in twenty additional stamps at an early day. It is the property of Thomas Findley, Henry Scadden, Joseph Woodworth, Geo. D. Roberts and A. E. Head. Cost of mill, about \$15,000.

From Edward F. Bean, History of Nev. Co., 1867

FOR CIGARS AND TOBACCO GO TO LIXON'S.
Mines and Mills of G.V.
GRASS VALLEY TOWNSHIP DIRECTORY.

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North Star.

At the French Lead, about two miles south of Grass Valley. Erected in 1866, on the mine of the North Star Company, at a cost of \$30,000. Runs sixteen stamps, with a 50-horse power engine, and is capable of crushing twenty-four tons of quartz every twenty-four hours. Crushes for the North Star Company. Owners, John C. Coleman, Edward Coleman, William Hoskin, W. H. Rodda, John Rodda, Josiah Rodda, James Rodda, Richard Kitto, William Dunston, and Thomas Harper, who are owners of the North Star mine.

Osborn Hill.

This mill, on Osborn Hill, about two miles southeast of Grass Valley, was erected in 1864, at an expense of about \$22,000. It has three batteries of five stamps each, and is run by a 50-horse power engine, which is capable of running double the present number of stamps. The mill can be used either for dry or wet crushing. Capacity, twenty tons of quartz (wet crushing) in twenty-four hours, and ten tons by the dry crushing process. Owned by the Osborn Hill Company, who purchased this mill and the Osborn Hill mine, from Joseph Woodward and George Vegas, last winter.

Perrin's.

Owned by Joseph Perrin, and situated near Wolf Creek Station, about five miles south of Grass Valley, is a saw and quartz mill combined, and is propelled by water power. Was built in 1864; the stamps, five in number, being added in 1865. First crushing in January, 1865. This mill, capable of crushing twelve tons of rock in twenty-four hours, is engaged on quartz from the Slate ledge, owned by Perrin & Colvin, and located near Forest Springs.

Rocky Bar.

Erected in 1856, on Massachusetts Hill, by the Mount Hope Company, of which Michael Brennan was agent at the time. Is a sixteen-stamp mill, being run by two engines, each 35-horse power. The mill, which is now crushing rock for the New York Hill Company, is capable of crushing forty tons of rock in twenty-four hours. Blanket process used. The Rocky Bar mill cost upward of \$20,000. Owned by the Rocky Bar Mining Company.

Sebastopol.

This mill, originally located at Sebastopol Hill, was removed to the present locality, Boston Ravine, in October, 1863. It runs twelve revolving stamps, is propelled by a 30-horse power engine, and can crush twenty-five tons of rock in twenty-four hours. The Sebastopol mill—one of the best custom mills in the township—cost about \$25,000. It is owned by Benjamin McCauley, the Watt Brothers, and Mrs. John Connolly. Blanket process used in this mill.

Smith & Northey's.

On Little Wolf Creek, about one mile and one-half from Grass Valley. Erected in 1864. Runs eight square-stem stamps, each weighing nine hundred and fifty pounds, the motive power being a thirty-horse power horizontal engine. Blanket process adopted, the interior arrangements being similar to those of the Sebastopol mill, with the exception that arrastras are used for grinding sulphurets and amalgamating rusty gold instead of pans. The mill is capable of crushing sixteen tons of rock in twenty-four hours. Principally engaged on custom work. Owned by Robert Smith, John Smith, Edward Northey, and Henry Morgan.

Stockton's.

On South Wolf Creek, about twelve miles from Grass Valley, is the ledge of

NECK TIES, SILK AND LINEN HANDKERCHIEFS, AT D. GAD'S.